

THE WATER MITE FAMILY ATURIDAE FROM AUSTRALIA, WITH DESCRIPTION OF SIX NEW SPECIES (ACARI: HYDRACHNELLAE).

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ABSTRACT

Four new species of the genus *Axonopsella*, *A. bidentata* sp. nov., *A. inflata* sp. nov., *A. pilbara* sp. nov. and *A. sigmoidea* sp. nov., one new species of the genus *Albia*, *A. rubicunda* sp. nov., and one new species of the genus *Austraturus*, *A. longisetus* sp. nov. are described from Northern Territory and Western Australia. *Albia rectifrons* Viets, *Austraturus longipalpis* Cook and *Twarntaturus australicus* Cook are recorded from Western Australia for the first time.

KEYWORDS: Water mites, new species, Northern Territory, Western Australia, Australia.

INTRODUCTION

The family Aturidae is represented in Australia by 13 genera (Cook 1986; Harvey 1990): *Frontipodopsis* Walter, *Tasmanaxona* Cook, *Wheenyella* Cook, *Axonopsella* Cook, *Albia* Thon, *Austraturus* Viets, *Spinaturus* Cook, *Cabellaturus* Cook, *Melenaturus* Cook, *Azugaturus* Cook, *Twarntaturus* Cook, *Barwontius* Viets and *Wheenyoides* Harvey. The most species-rich genera in Australia are *Axonopsella* (27 species) and *Austraturus* (10 species).

Only one species of the family, *Wheenyoides cooki* Harvey, has been previously recorded from the Northern Territory and Western Australia (Harvey 1990).

In the present study, four new species of *Axonopsella*, one of *Albia* and one of *Austraturus*, are described. Further, new records of *Albia rectifrons* Viets, *Austraturus longipalpis* Cook and *Twarntaturus australicus* Cook are reported.

MATERIAL AND METHODS

All material was collected by the author. Western Australia and Northern Territory holotypes and most paratypes have been deposited in the Western Australian Museum (Perth) (WAM)

and in the Museum and Art Gallery of the Northern Territory (Darwin) (NTM). Additional paratypes and all referred material have been deposited in the Zoological Museum of the University of Amsterdam (ZMA).

The following abbreviations are used: Cx II - second coxal plates; Cx 4 - coxoglandularia 4; PII - second segment of palp; IV-leg-4 - fourth segment of fourth leg. Measurements are in μm . Measurements of paratypes are given in brackets.

SYSTEMATICS

Axonopsella Lundblad, 1930

Axonopsella Lundblad, 1930: 54.

In most cases it is impossible to recognize females of this genus. Females are therefore not always illustrated. The assignment of the females is based on association with the males with which they were collected. As stated by Cook (1986), palps are not very variable in the Australian *Axonopsella* species and are therefore not illustrated for most species. The separate antenniform platelet is only visible in an anterolateral view, as it is located just ventral of the anterior margin of the dorsal shield, and is therefore not illustrated.

Axonopsella bidentata sp. nov.

(Fig. 1A-D)

Type material. HOLOTYPE - NTM A95, ♂, Radon Springs, Kakadu National Park, Northern Territory, Australia, 19 July 1994.

Diagnosis. Fourth pair of acetabula pointed and extending well beyond posterior body margin. Ventral margin of heavy seta of IV-leg-4 with two teeth.

Description. *Male.* Dorsal and ventral shield present. Body 300 long and 235 wide; body colour lilac. Antenniform setae on separate platelet. Ventral shield with rounded posterolateral extension. Suture line of Cx I/II complete, all other suture lines of coxal plates incomplete or absent. Ventrum without ridges posterior to insertion of fourth legs. Gonopore 36 long. Fourth coxal plates without glandularia. First pair of acetabula placed on posterior margin of fourth

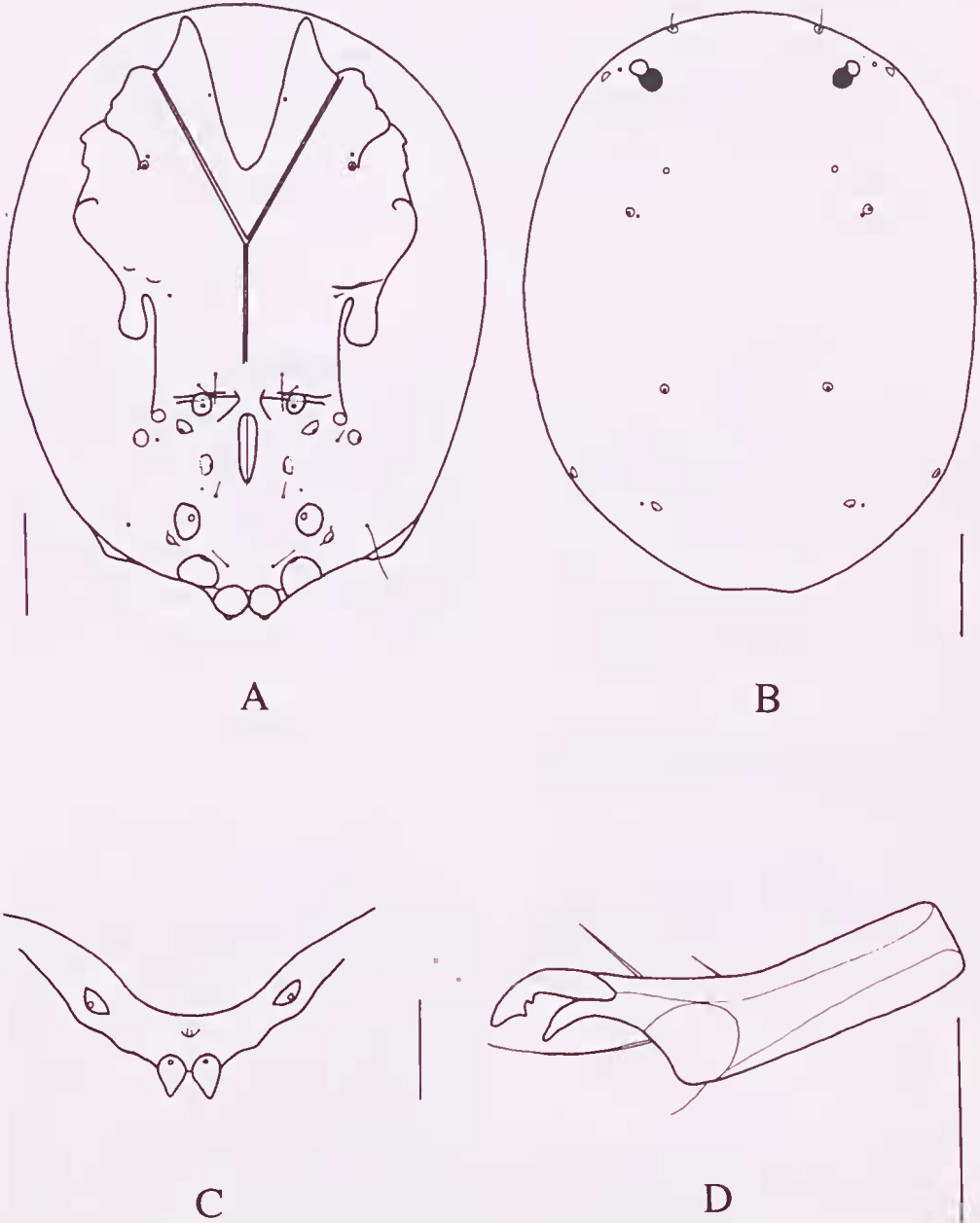


Fig. 1. *Axonopsella bidentata* sp. nov., ♂, A, ventral view; B, dorsal view; C, posteromedial view; D, IV-leg-4. Scale lines A, B, C and D: 50 μ m.

coxal plates. Three pairs of acetabula located posteriorly and close together (Fig. 1A). One pair extends well beyond posterior body margin; this pair downturned and pointed. Arrangement of genital glands and genital glandularia as in Figure 1C. Dorsal lengths of PI-PV: 12, 41, 28, 54, 28; ventral margin of PII smooth. Palp normal for genus. II-leg-6 with unmodified claws. Heavy seta of IV-leg-4 relatively small, ventral margin with two teeth (Fig. 1D). Dorsal lengths of I-leg-4-6: 62, 72, 48. Dorsal lengths of IV-leg-4-6: 82, 89, 71; IV-leg-4 with three rudimentary swimming setae, one located anteriorly and two located posteriorly.

Female. Unknown.

Remarks. The shape of IV-leg-4 and the configuration of the acetabula will easily separate the new species from other species of the genus.

Etymology. Named for the two teeth on the ventral margin of the heavy setae of IV-leg-4.

Axonopsella inflata sp. nov.
(Fig. 2A-E)

Type material. HOLOTYPE - NTM A96, ♂, Lily Pond Falls, Katherine Gorge National Park, Northern Territory, Australia, 27 July 1994. PARATYPE - NTM A97, 1 ♀, same data as holotype.

Diagnosis. Large species; male II-leg-6 of triangular shape and II-leg-5 swollen.

Description. *Male.* Body 495 long and 417 wide; body colour yellowish brown. Dorsal and ventral shields present. Antenniform setae on separate platelet. All suture lines of coxal plates incomplete or absent. Cx IV with glandularia; medial suture line of Cx IV 120 long. Ventrums with ridges posteriorly of insertion of fourth legs. Gonopore large, 72 long. Genital glands flanking gonopore (Fig. 2A). Three pairs of acetabula near posterior end of body, most posterior pair located terminally (Fig. 2C). Dorsal lengths of PI-PV: 29, 84, 31, 98, 41; ventral margin of PII smooth. Dorsal lengths of I-leg-4-6: 96, 118, 77. Dorsal lengths of II-leg-4-6: 91, 173, 84. II-leg-6 very stocky (Fig. 2D), inner side almost triangular, outer side with anterior extension; II-leg-5 swollen, anterior part covered with many fine setae. Claws of second leg modified. Dorsal lengths of IV-leg 4-6: 86, 149, 118; heavy seta of IV-leg-4 large and falcated (Fig. 2E). II-leg-5 and III-leg-5 with two swimming setae, IV-leg-3 and 4 with one swimming seta.

Female. Body 616 long and 504 wide. Dorsal shield 611 long and 466 wide, posterior margin straight. Antenniform setae on separate platelet. Suture lines between Cx III/IV incomplete. Gonopore 86 wide, genital field 185 wide. Dorsal lengths of PI-PV: 30, 78, 53, 106, 43; palp as in male. Dorsal lengths of I-leg-4-6: 85, 101, 60. Dorsal lengths of IV-leg-4-6: 109, 113, 89. II-leg-5, III-leg-5 and IV-leg-5 with two swimming setae.

Remarks. This is the second largest *Axonopsella* species from Australia, only *A. magna* Cook is larger. The female of *A. magna* has a truncated posterior dorsal shield.

Etymology. Named for its swollen II-leg-5.

Axonopsella pilbara sp. nov.
(Fig. 3A-C)

Type material. HOLOTYPE - WAM 96/937, ♂, streams originating in Chinderwariner Pool, Millstream-Chichester National Park, Western Australia, 15 August 1994. PARATYPES - WAM 96/938-9, 2 ♀♀, same data as holotype; ZMA, 2 ♀♀, Fortescue Falls (pool), Hamersley Range National Park, Western Australia, 11 August 1994; NTM A98 - A103 incl., 6 ♀♀, Deep Reach Pool, Millstream-Chichester National Park, Western Australia, 15 August 1994.

Diagnosis. Ventrums of male posteriorly with three pairs of acetabula in an arc, genital gland flanking posterior end of gonopore, genital glandularia anterolateral of genital glands, well posterior to posterior suture lines of fourth coxal plates. Genital valves of female pear-shaped, narrowest anteriorly.

Description. *Male.* Dorsal and ventral shields present; body shape rounded. Body 349 long and 282 wide; body colour brownish. Antenniform setae on narrow separate platelet. Gonopore 34 long. Fourth coxal plates without glandularia. First pair of acetabula located close to posterior suture line of fourth coxal plates. Genital gland flanking posterior end of gonopore, genital glandularia anterolateral of genital glands, well posterior to posterior suture lines of fourth coxal plates. Posterior three pairs of acetabula in an arc (Fig. 3A). Dorsal lengths of PI-PV: 20, 50, 26, 65, 26; ventral margin of PII straight, anteriorly with two tiny teeth. Dorsal lengths of I-leg-4-6: 62, 62, 46. Second legs unmodified. Dorsal lengths of IV-leg-4-6: 67, 80, 67; IV-leg-4 with falcated heavy seta (Fig. 3B).

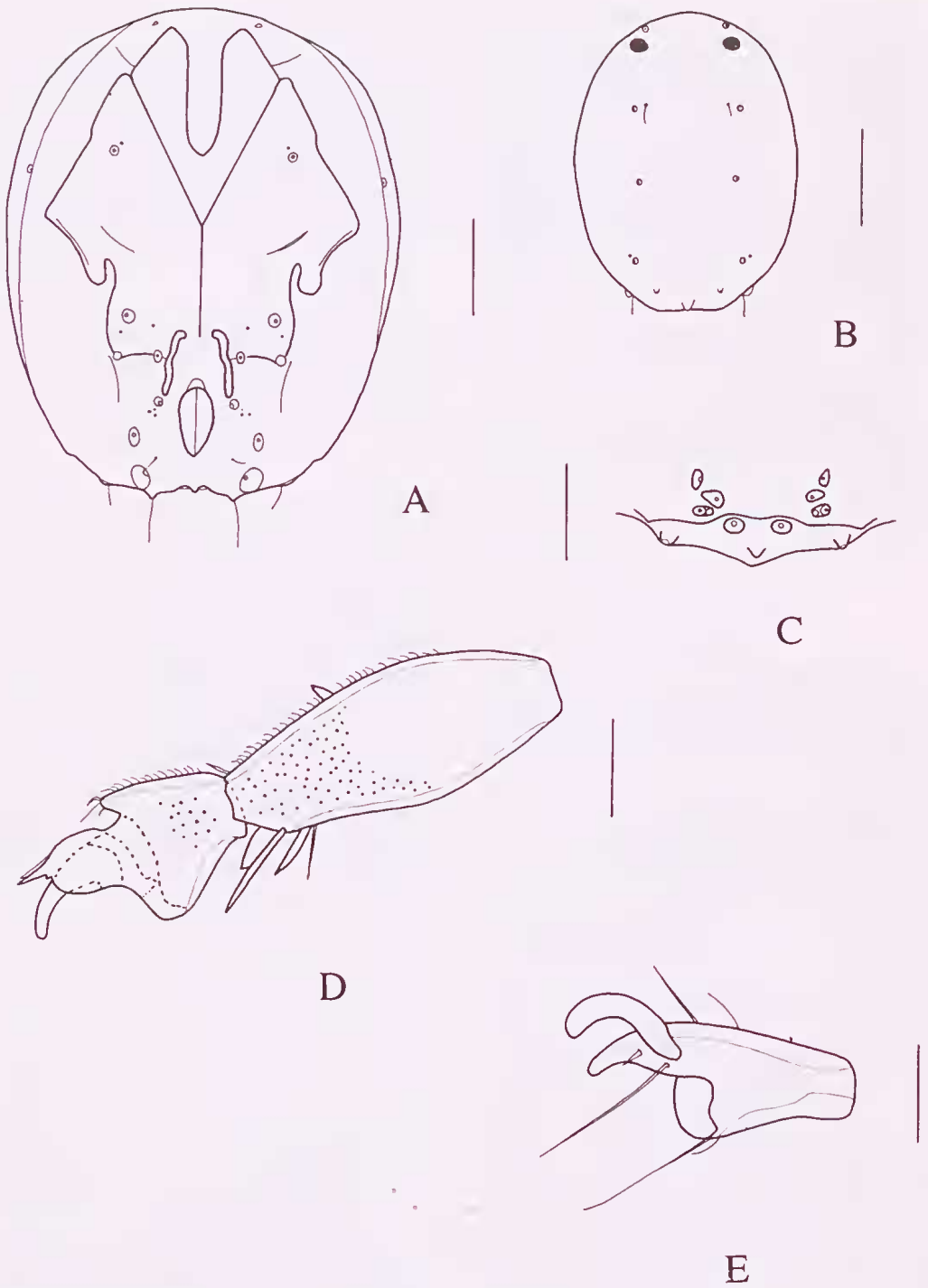


Fig. 2. *Axonopsella inflata* sp. nov., ♂. A, ventral view; B, dorsal view; C, posteromedial view; D, II-leg-4-6; E, IV-leg-4. Scale lines D, E: 50 μ m; A, C: 100 μ m; B: 200 μ m.

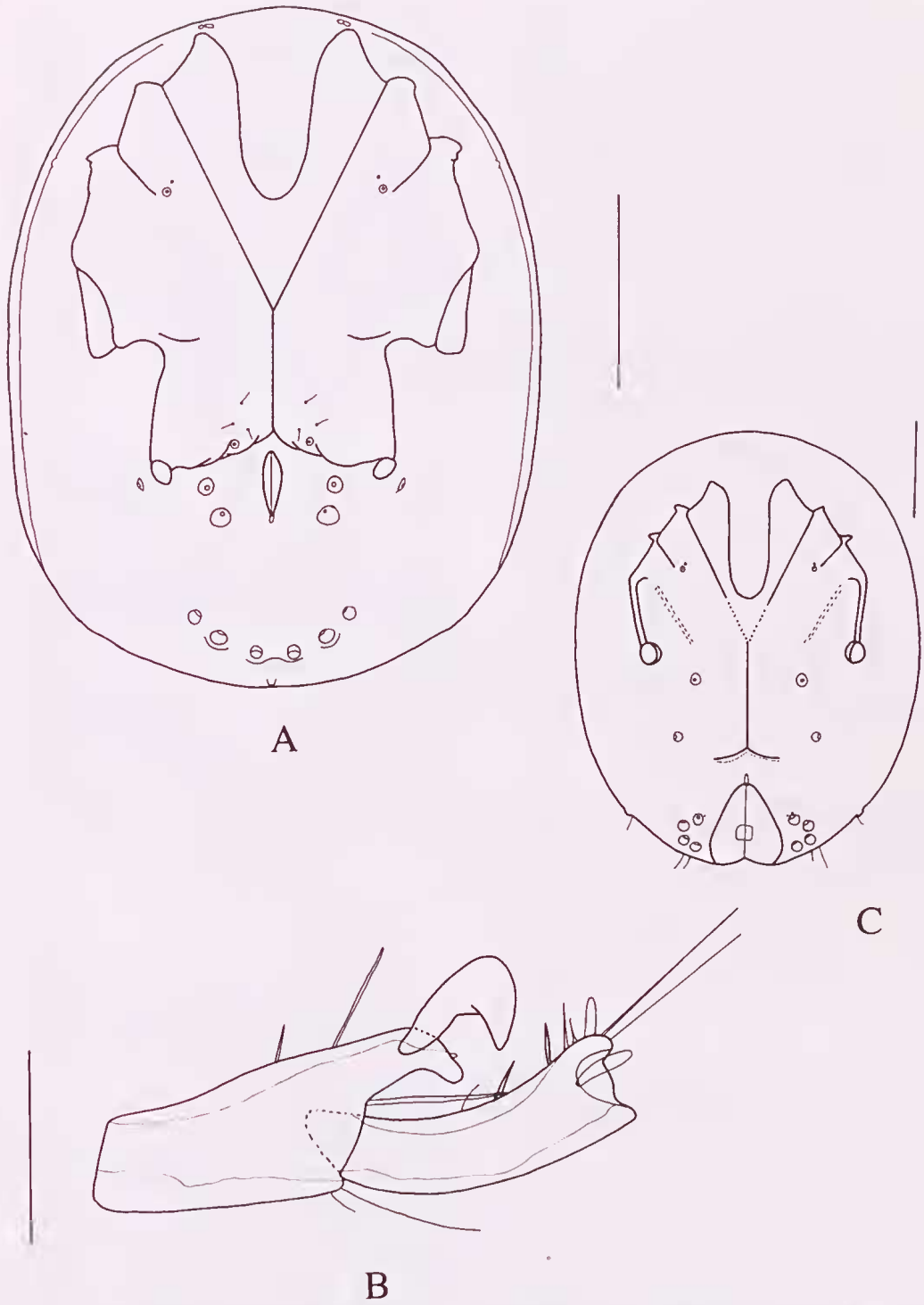


Fig. 3. *Axonopsella pilbara* sp. nov. A, σ^7 , ventral view. B, σ^7 , IV-leg-4. C, φ , ventral view. Scale lines B: 50 μm ; A, C: 100 μm .

Female. Body 456 (407) long and 378 (325) wide. Antenniform setae on narrow separate platelet. Suture line between coxal plates incomplete. Two pairs of glandularia on fourth coxal plates widely separated. Width of genital field 194, gonopore 78 long. Genital valves pear-shaped, narrowest anteriorly (Fig. 3C). Four pairs of acetabula not in an arc, but first and fourth pair located more antero- or posteromedially. Dorsal lengths of PI-PV: 22, 66, 28, 70, 31; ventral margin of PII straight, smooth. Dorsal lengths of I-leg-4-6: 48, 65, 48; dorsal lengths of IV-leg-4-6: 79, 96, 60. III-leg-4 and IV-leg-4 with two swimming setae.

Remarks. The male of the new species is very close to *A. truzza* Cook, which has the same configuration of the first acetabula, genital glands and genital glandularia. Differences between the two species can be found in the three pairs of acetabula, which form a less bowed arc in *A. pilbara*, while ridges extending posteriorly from the insertion of the fourth legs are lacking in the new species. Females of the new species are easily separable from other species by the pear-shaped genital valves.

Etymology. Named after the Pilbara Region where the specimens were collected.

Axonopsella sigmoidea sp. nov.
(Fig. 4A-E)

Type material. HOLOTYPE - NTM A104, ♂, Radon Springs, Kakadu National Park, Northern Territory, Australia, 19 July 1994. PARATYPES - ZMA, 1 ♂, plunge pool, Barramundie Creek, Kakadu National Park, Northern Territory, Australia, 24 July 1994; WAM 96/940, 1 ♂, and NTM A105, 1 ♀, small stream, Butterfly Gorge, Katherine Gorge National Park, Northern Territory, Australia, 27 July 1994.

Diagnosis. Presence and shape of modified claws of II-leg-6 and shape of IV-leg-4 (large anteroventral extension with sigmoid seta) diagnostic.

Description. *Male.* Dorsal and ventral shield present; posterior body margin concave. Body 402 long and 310 wide; body colour yellowish brown. Antenniform setae on separate platelet. All suture lines of coxal plates incomplete or absent. Ventrums with short ridges posterior of insertion of fourth legs. Pair of large glandularia located on fourth coxal plates near posterolateral corners. First pair of acetabula located slightly posterior to posterior suture line of fourth

coxal plates (Fig. 4A). Three pairs of large acetabula located near posterior body margin (Fig. 4C). Genital glands flanking the gonopore. Gonopore large, 48 long. Dorsal lengths of PI-PV: 22, 52, 31, 62, 31; ventral margin of PII smooth. Dorsal lengths of I-leg-4-6: 68, 77, 62. Dorsal lengths of II-leg-4-6: 82, 120, 65; claws of II-leg-6 modified (see Fig. 4D). Dorsal lengths of IV-leg-4-6: 78, 101, 101; IV-leg-4 with large anteroventral extension, anteriorly pointed, with relative small sigmoid seta (Fig. 4E). When in different position, this seta appearing wider and less sigmoid. III-leg-5 and IV-leg-4 with one swimming seta, II-leg-5 and IV-leg-5 with two swimming setae; swimming setae of IV-leg reduced.

Female. Body 475 long and 359 wide. Dorsal and ventral shields present. Antenniform setae on separate platelet. Dorsal shield laterally with two ridges over almost its whole length. Medial margin of fourth coxal plates 108 long. Genital valves 77 wide, genital field 145 wide. Four pairs of acetabula in an arc. Dorsal lengths of PII-PV: 50, 26, 65, 34. Dorsal lengths of IV-leg-4: 79, 89, 86. II-leg-5, III-leg-5 and IV-leg-5 with two swimming setae.

Remarks. The male of the new species is easily separable from other *Axonopsella* species by the shape of IV-leg-4. Females are probably not separable from other species.

Etymology. Named for the sigmoid seta on the anteroventral extension of IV-leg-4.

Albia Thon, 1899

Albia Thon, 1899: 100.

Albia (Spinalbia) rectifrons Viets, 1935

Albia rectifrons Viets, 1935: 692.

Albia rectifrons - Uchida and Imamura 1951: 336; - Lundblad 1969: 387; - Cook 1986: 239; - Wiles 1992: 470.

Material examined. *Northern Territory.* ZMA, 1 ♀, Radon Springs, Kakadu National Park, 19 July 1994; 4 ♂♂, 22 ♀♀, billabong, Nourlangie Creek, Kakadu National Park, 20 July 1994; 1 ♀, billabong, Yellow Waters, Kakadu National Park, 21 July 1994; 15 ♂♂, 29 ♀♀, pond in Jim Jim Creek, at Jim Jim Crossing, Kakadu National Park, 22 July 1994; 3 ♂♂, 3 ♀♀, Jim Jim Billabong, at crossing with Kakadu Highway, 22 July 1994; 1 ♀, small billabong, Yellow Waters, Kakadu National Park, 22 July 1994; 1 ♀, pool near Jim Jim Falls, Kakadu

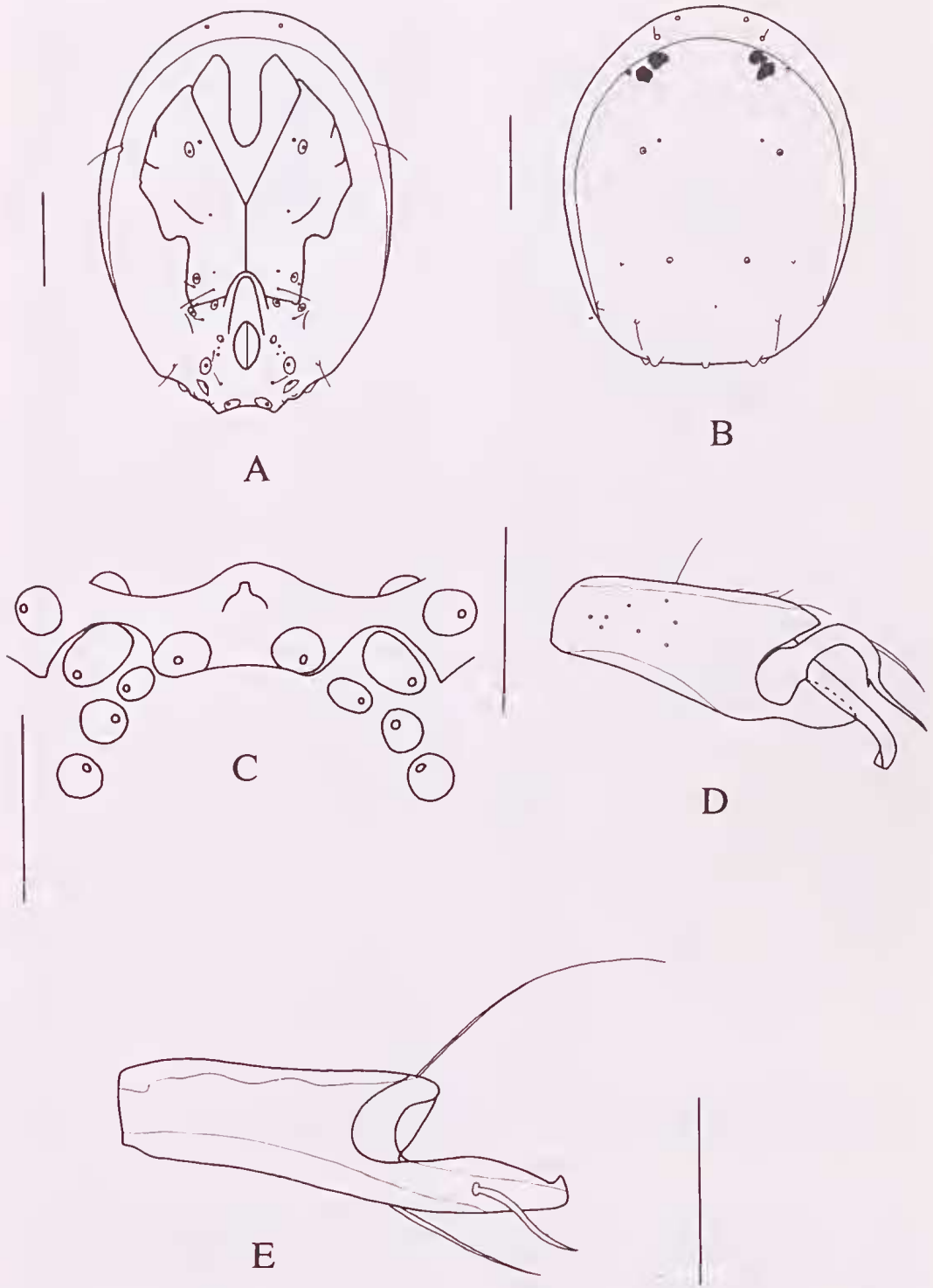


Fig. 4. *Axonopsella sigmoidea* sp. nov., ♂. A, ventral view; B, dorsal view; C, postero-medial view; D, II-leg-6; E, IV-leg-4. Scale lines C, D, E: 50 μ m; A, B: 100 μ m.

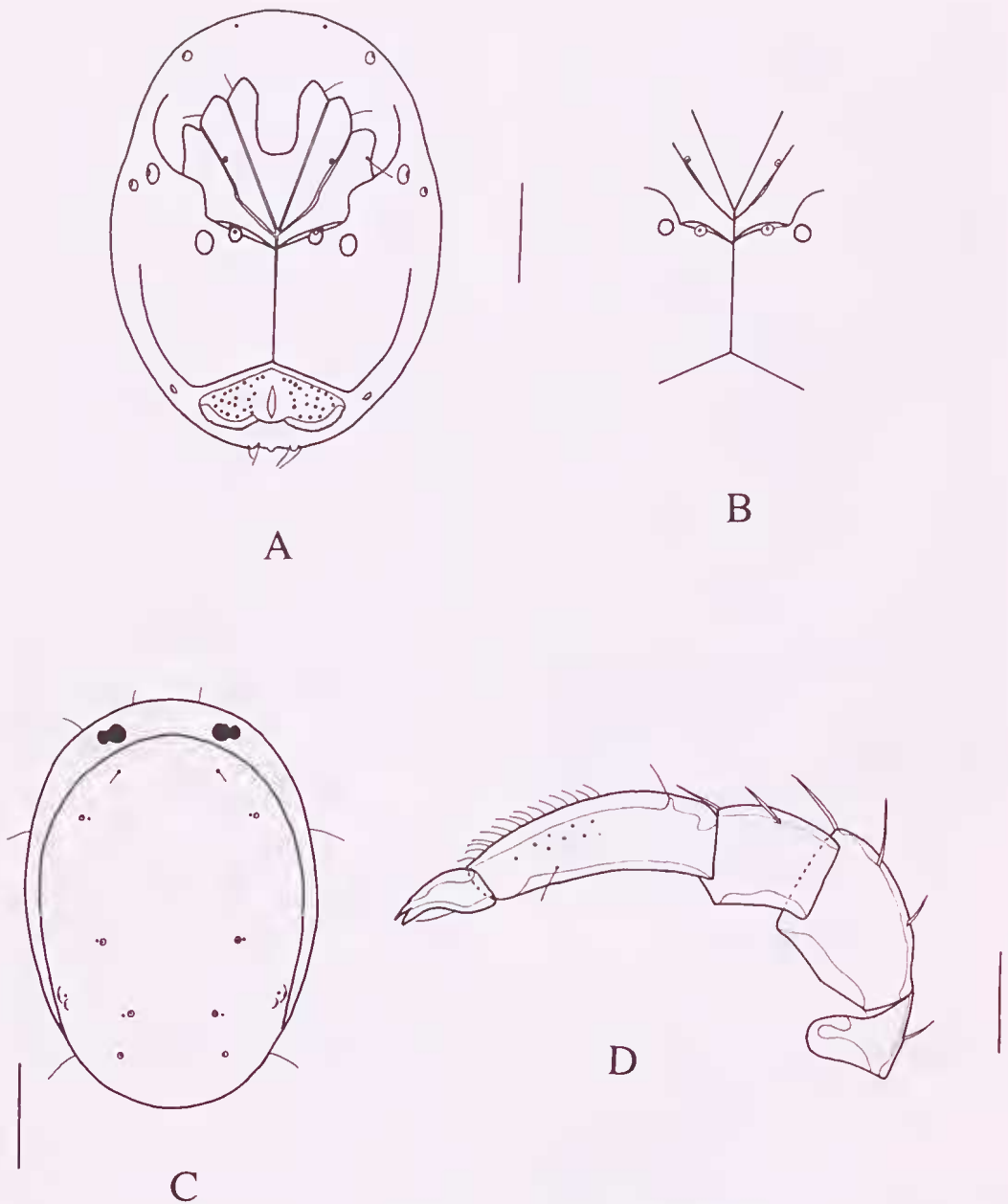


Fig. 5. *Albia rubicunda* sp. nov., ♂. A, ventral view; B, detail of suture lines paratype; C, dorsal view; D, palp. Scale lines D: 50µm; A, B, C: 200 µm.

National Park, 23 July 1994; 4 ♂♂, 6 ♀♀, pond Jim Jim Creek, near Jim Jim campground, Kakadu National Park, 23 July 1994; 2 ♀♀, pools upstream of Waterfall Creek Falls, Kakadu National Park, 25 July 1994; 3 ♂♂, 3 ♀♀, plunge pool, Gunlom Falls, Kakadu National Park, 25 July 1994; 3 ♂♂, 2 ♀♀, Lily Ponds Falls, Katherine Gorge National Park, 27 July 1994; 1

♂, 1 ♀, plunge pool Edith Falls, Katherine Gorge National Park, 30 July 1994; 1 nymph, Douglas River, Douglas Hot Springs, 1 August 1994.

Western Australia. ZMA, 3 ♀♀, Chinderwariner pool, Millstream-Chichester National Park, 15 August 1994; 2 ♀♀, small streams originating in Chinderwariner Pool, Millstream-Chichester National Park, 15 August 1994;

1 nymph, Deep Reach Pool, Millstream-Chichester National Park, 15 August 1994; 1 ♀, small pond near Crossing Pool, Millstream-Chichester National Park, 16 August 1994; 4 ♀♀, 1 nymph, Crossing Pool, Millstream-Chichester National Park, 16 August 1994; 9 ♀♀, western part Deep Reach Pool, Millstream-Chichester National Park, 16 August 1994; 1 ♀, Fortescue River, at crossing with North West Coastal Highway, 18 August 1994.

Remarks. *Albia rectifrons* is a common and sometimes abundant species in ponds and small lakes of the Northern Territory and Western Australia.

Cook (1986) reported the species from Tasmania, Victoria, New South Wales and Queensland, all from lotic habitats. However, Wiles (1992) supposed that this was a separate species, because the Asian *A. rectifrons* lives in lentic habitats. According to Wiles the specimens described by Cook (1986) have a more rounded anterior margin. Furthermore, the length of the ventral shield to posterior of Cx IV of Asian specimens is of equal length, or shorter than, the maximum body width. Cook's specimens from Australia have the length of ventral shield longer than the maximum body width. The specimens from this study differ from the Asian populations in the body colour (yellowish in Australian specimens, olive grey/green in Asian specimens). Additionally, the specimens of this study are more slender compared to the Asian specimens, the ratio length ventral shield to posterior margin of Cx IV / width of ventral shield is 1.1-1.3 in Australian specimens, and 0.95-1.1 in Asian specimens (Wiles 1992). As in the Asian specimens, the ventral shield of the specimens of this study is truncated. I consider the differences in colour in water mites of minor importance; there are more genera which show a striking variation in colour, e.g. *Arrenurus*. Therefore, the most important difference between the Asian specimens and the specimens of this study is the body shape. However, the differences are in my opinion too small to justify a separate ranking.

Albia (Albiella) rubicunda sp. nov.
(Fig. 5A-D)

Type material. HOLOTYPE - NTM A106, ♂, Radon Springs, Kakadu National Park, Northern Territory, Australia, 19 July 1994.

PARATYPES - WAM 96/941-2, 2 ♂♂; and ZMA, 2 ♂♂ and 1 nymph, same data as holotype.

Diagnosis. Suture lines of Cx I/II and Cx II/III fusing at same point at midline or posterior of Cx I/II fusing point with midline; suture line of Cx III/IV near midline not bowed; Cx 4 between leg sockets.

Description. *Male.* Dorsal shield 912 (781-847) long, width of holotype not measurable (paratypes: 563-611). Dorsoglandularia 3 close to and lateral of lateroglandularia 3. Body colour yellowish to reddish brown. Ventral shield 849 long and 645 wide; ventral shield slightly narrowed anteriorly. Coxae without spine-like setae. L 1 anterior and median to L 2. Suture line of Cx I/II, Cx II/III and Cx III/IV complete. Suture lines of Cx I/II and Cx II/III fusing at midline at same point (Fig. 5A) or posterior of fusing point of Cx I/II with midline (Fig. 5B). Cx 4 large, situated between IV-leg sockets, on suture line of Cx III/IV; suture line of Cx III/IV almost not bowed near midline. Suture line of Cx III/IV weakly indented anterior to genital field. Genital field 286 wide; gonopore 64 long. Lengths of PI-PV: 43, 84, 62, 120, 41. Lengths of I-leg-4-6: 89, 106, 103. IV-leg of holotype lost. Lengths of IV-leg-4-6 of paratype: 116, 121, 107; second, third and fourth legs with swimming setae.

Female. Unknown.

Remarks. Three species of the subgenus *Albiella* are known from Australia, i.e. *A. australica* Cook, *A. lundbladi* Cook and *A. brokenensis* Smit. The new species differs from *A. australica* and *A. brokenensis* in the almost straight suture line of Cx III/IV near the midline. Further, the genital field of the new species is much wider compared to *A. australica*. *A. lundbladi* has Cx 4 far anterior of IV-leg sockets.

Etymology. Named for its conspicuous reddish-brown colour.

Austraturus K.O. Viets, 1978

Austraturus K.O. Viets, 1978: 87.

Austraturus longisetus sp. nov.
(Fig. 6A-D)

Type material. HOLOTYPE - NTM A107, ♂, plunge pool, Edith Falls, Katherine Gorge National Park, Northern Territory, Australia, 30 July 1994.

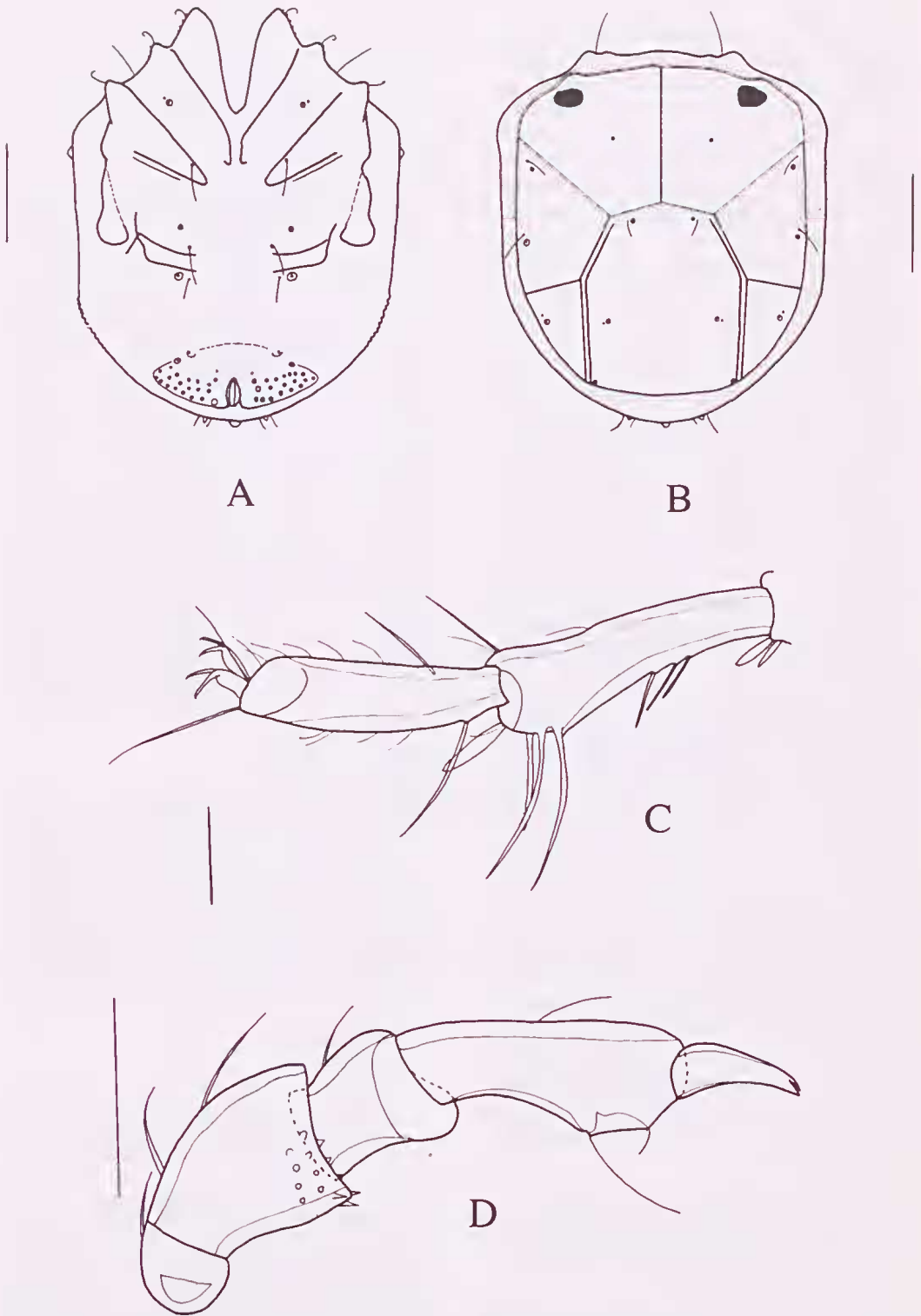


Fig. 6. *Austraturus longisetus* sp. nov., ♂, A, ventral view; B, dorsal view; C, IV-leg-5-6; D, palp. Scale lines C, D: 50 μ m; A, B: 100 μ m.

Diagnosis. Long setae on ventral margin of IV-leg-5 and 6 and bulge on ventral margin of PIV diagnostic.

Description. Male. Body 373 long and 325 wide. Dorsal and ventral shields present. Accompanying seta of glandularia of dorsal shield not thickened. Posteromedial plate of dorsum with three pairs of glandularia; this plate not modified and without concavity (Fig. 6B). Gonopore 39 long. Genital plates with numerous acetabula. Dorsal lengths of PI-PV: 31, 59, 31, 72, 34. Ventral margin of PIV with large bulge, PII anteroventrally with denticles, which extend onto lateral margin of this segment (Fig. 6D). Dorsal lengths of IV-leg-4-6: 127, 146, 115. Ventral margin of IV-leg-5 and 6 with three and two long setae respectively; long setae on IV-leg-5 whole or partially hyaline (Fig. 6C). One short hyaline seta anteroventrally on IV-leg-4 and 5; IV-leg-4 not modified.

Female. Unknown.

Remarks. Most Australian species of this genus have short setae on IV-leg-5 and 6. Only *A. tumidipalpis* Viets has two long setae anteroventrally on IV-leg-5 (three in *longisetus*) and one short seta on IV-leg-6. *Austraturus vietsi* has one long seta on IV-leg-5. All known species of the genus lack the long anteroventral seta of IV-leg-6.

Etymology. Named for the long setae on IV-leg-5 and 6.

Austraturus longipalpis Cook, 1986

Austraturus longipalpis Cook, 1986: 258.

Material examined. ZMA, 1 ♀, streams originating in Chinderwariner Pool, Millstream-Chichester National Park, Western Australia, Australia, 15 August 1994.

Remarks. Previously, this species was only known from two females collected by Cook (1986) in Queensland. The female from Western Australia has a slightly different body shape (posteriorly not truncated, first coxal plates more pointed), while the palp segments are larger. The shape of the unusual palp is similar to the Queensland specimens. Dorsal lengths of PI-PV (measurements of Cook 1986 given in brackets): 22 (19-21), 74 (67-69), 60 (48-51), 164 (138-143), 31 (33-34).

Twarntaturus Cook, 1986

Twarntaturus Cook, 1986: 266.

Twarntaturus australicus Cook, 1986

Twarntaturus australicus Cook, 1986: 266.

Material examined. ZMA, 1 ♂, 2 ♀♀, Barramundie Creek, Kakadu National Park, Northern Territory, Australia, 24 July 1994; 1 ♂, outlet Upper Pool, Edith Falls, Katherine Gorge National Park, Northern Territory, Australia, 30 July 1994.

Remarks. This species has previously only been reported from Queensland (Cook 1986).

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